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AD-A275 383

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*

2. REPORT DATE
11/22/93

3. REPORT TYPE AND DATES COVERED
FINAL REPORT 8/12/91 - 8/31/93

4. TITLE AND SUBTITLE
Stability of Dynamical Systems in the Presence of Noise

5. FUNDING NUMBERS
DAAL03-91-G-0311

2

6. AUTHOR(S)
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FEB 09 1994
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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633 Clark Street
Evanston, Illinois 60208

8. PERFORMING ORGANIZATION REPORT NUMBER
0650-300-L407

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Research Office
P.O. Box 12211
Research Triangle Park, NC 27709-2211

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
ARO 28905.6-MA

11. SUPPLEMENTARY NOTES
The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

94 2 08 004

94-04276

13. ABSTRACT *(Maximum 200 words)*
Pinsky's research is concerned with the exponential growth rate (= Lyapunov exponent) of solutions of stochastic differential equations. In a paper to appear in the Annals of Applied Probability, a formula is obtained for the quadratic Lyapunov exponent of the simple harmonic oscillator in the presence of a finite-state Markov noise process. In case the noise process is reversible, the quadratic Lyapunov exponent is strictly less than for the corresponding white noise process obtained from the central limit theorem. An example is presented of a non-reversible Markov noise process for which this inequality is reversed. In another article, to appear in the volume "Stochastic Partial Differential Equations and their Applications" in the Springer Verlag Lecture Notes in Control and Information Sciences (Proceedings of the 1991 Charlotte NC Conference on SPDE, ed. B. Rozovskii), the Lyapunov exponent is computed for the solution of a hyperbolic partial differential equation with damping. In this case, one studies the exponential growth rate of the energy of the solution with Dirichlet boundary conditions. The detailed results depend on the size of the damping constant (overdamped vs. underdamped case). To our knowledge, this is the first study ever of the Lyapunov exponent for a partial differential equation. (cont'd on next page)

14. SUBJECT TERMS
Lyapunov exponent, stochastic oscillator, Fourier transform, heat kernel

15. NUMBER OF PAGES
2

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

REPORT DOCUMENT PAGE

(continuation of block 13, Abstract)

In a different direction, Pinsky has been studying the pointwise covergence of certain Fourier expansions of piecewise smooth functions in multi-dimensional Euclidean space. It has been discovered that there appears a new kind of Gibbs phenomenon--due to certain discontinuities of the functions on the boundary of the domain, and which affect the convergence at an interior point of the domain. This kind of non-localization is totally unknown in the case of one-dimensional Fourier analysis, but appears for the first time in three dimensions (and all higher dimensions). A paper detailing these results in the case of Fourier transforms has been accepted for publication in the Journal of Theoretical Probability.

Hsu's research involves asymptotic properties of Brownian motion in various settings. In the case of a two-dimensional manifold with Gaussian curvature satisfying a weak negative upper bound and no lower bound, he has shown (in joint work with W. Kendall) that the angular component has a limit for large time and that the limiting random variable has a distribution whose support is dense on the unit circle at infinity. In the case of reflecting Brownian motion on a Euclidean domain, a monotonicity property of the heat kernel with respect to the domain is established by probabilistic methods. In further work in progress, it is shown under what conditions the Brownian motion is a semimartingale.

LIST OF PUBLICATIONS:

1. (Elton P. Hsu) On the theta function of a Riemannian manifold with boundary, Transactions of the American Mathematical Society, 333 (1992), 543-671.
2. (Elton P. Hsu) On the principle of not feeling the boundary for diffusion processes (preprint, 12/30/92).
3. (Mark Pinsky) Extremal character of the Lyapunov exponent of the stochastic harmonic oscillator, Annals of Applied Probability 4 (1992), 942-950.
4. (Mark Pinsky) Mean exit time from a bumpy sphere, Proceedings of the American Mathematical Society, to appear.
5. (Mark Pinsky) Fourier series of radial functions in several variables, Journal of Functional Analysis, 116 (1993), 111-132.
6. (Mark Pinsky) Pointwise Fourier inversion for piecewise smooth functions in several variables, Proceedings of the American Mathematical Society, 118 (1993), 903-910.
7. (Mark Pinsky) Fourier inversion for multi-dimensional characteristic functions, Journal of Theoretical Probability, 6 (1993), 187-193.
8. (Mark Pinsky) Gibbs Phenomenon for Fourier-Bessel series, Expositiones Mathematicae, 11 (1993), 123-135.